

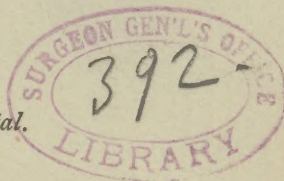
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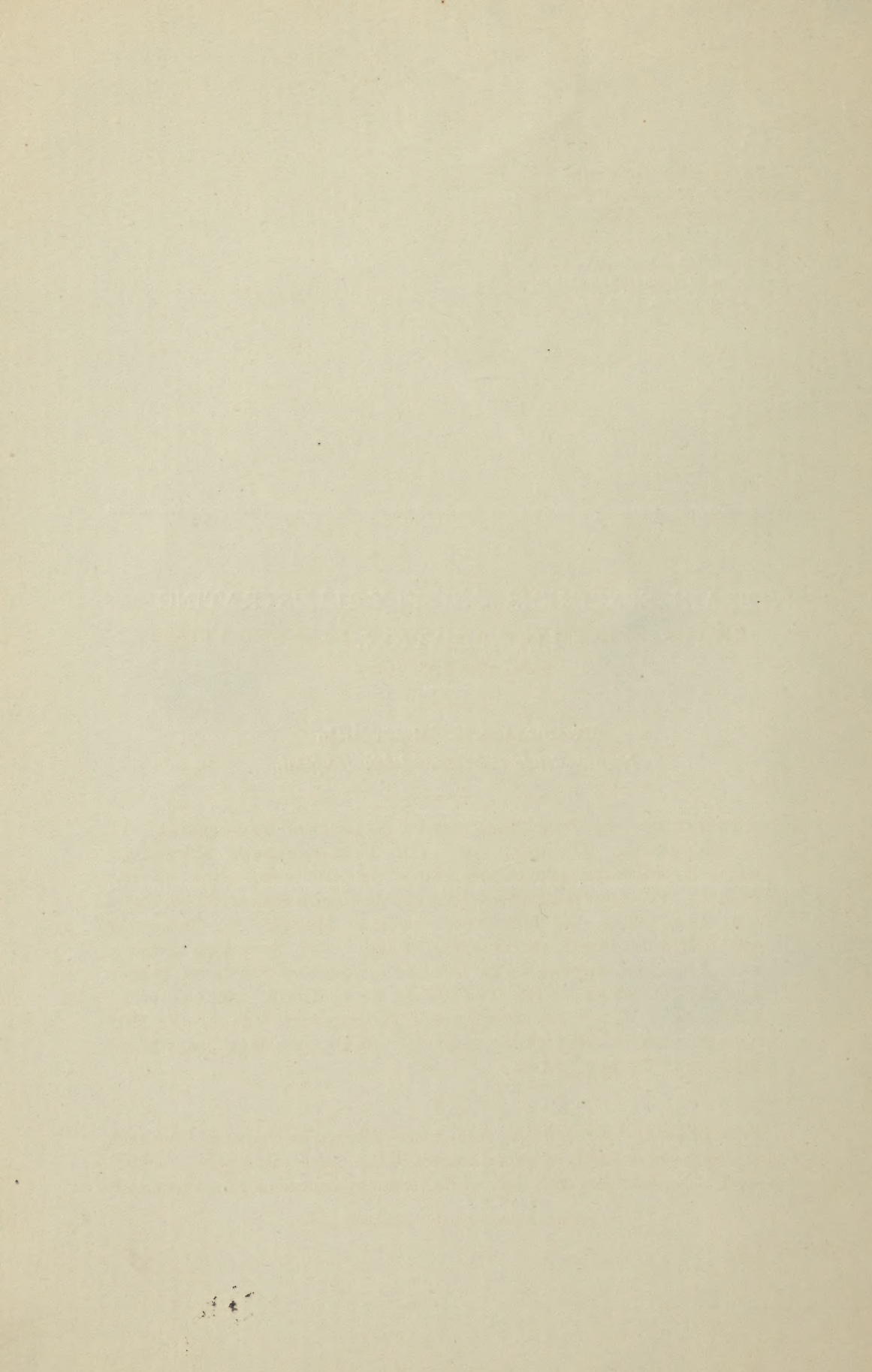
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BRAIN SPECIMENS CHIEFLY ILLUSTRATING  
LOCALIZATION.

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BY CHARLES K. MILLS, M.D.,  
*Neurologist to the Philadelphia Hospital.*  
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presented by the author -





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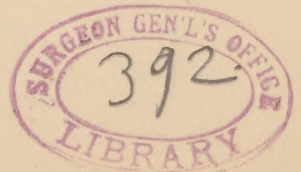
## BRAIN SPECIMENS CHIEFLY ILLUSTRATING LOCALIZATION.<sup>1</sup>

BY CHARLES K. MILLS, M.D.,  
*Neurologist to the Philadelphia Hospital.*

- I. SOFTENING OF THE FACE AREA WITH ORO-LINGUAL MONOPLÉGIA. II. INTRACEREBRAL HEMORRHAGE. III. INTRACEREBRAL SOFTENING, WITH HEMIPLEGIA AND CONTRACTURE ON THE SAME SIDE AS THE LESION. IV. OLD HEMORRHAGIC CYST OF LARGE SIZE WITH APHASIA AND HEMIPLEGIA. V. TUMOR OF THE DURA MATER. VI. TUMOR OF THE ANTERIOR FOSSÆ AND ORBITAL LOBES. VII. SPECIMEN SHOWING THE RELATION BETWEEN THE RETRO-INSULAR AND SUPERIOR TEMPORAL CONVOLUTIONS. VIII. THE BRAIN OF AN IDIOT. IX. OCCIPITAL LOBES OF A MAN BLIND MORE THAN TWENTY-FIVE YEARS. X. (REPORTED WITH DR. ROLAND G. CURTIN.) BRAIN OF A MAN, DEAF-MUTE MORE THAN THIRTY YEARS.

THE following specimens are from cases, diverse in character, but each having some point or points of special interest to the neuro-pathologist or neuro-anatomist. I present them with little or no comment, instead of using them sepa-

<sup>1</sup> Presented to the Philadelphia Pathological Society.



rately in formal papers, hoping that the reports may prove useful to those in search of such records.

I. SOFTENING OF THE FACE-AREA WITH ORO-LINGUAL MONOPLÉGIA.—C. O'L., aged 50, white, salesman, was admitted to the Hospital, December 15, 1888. Three or four weeks before he went to bed apparently well, but while dressing in the morning his right face and limbs became partially paralyzed; he did not fully lose consciousness, but was unable to speak.

He was carefully examined December 18, 1888, and the following record made: "He can corrugate the forehead horizontally and vertically; he can shut both eyes simultaneously; he can close the left eye alone readily, but he can scarcely close the right without the left. He cannot draw the right corner of the mouth directly upward, outward, or downward. He can easily dilate both nostrils together, but singly very poorly, though equally. He can barely manage to whistle, and in doing this he uses the left side of the mouth more firmly than the right. He has difficulty in thrusting out his tongue; the tip is usually caught behind the lower teeth, being turned down and slightly under; he can, however, manage to protrude it with difficulty, and on accomplishing this, it shows a deflection to the right of about 70°. The uvula deflects slightly to the right. He opens and shuts his mouth without difficulty."

The conclusions at this time were that the patient had distinct facial paralysis in the muscles supplied by the lower distribution of the seventh nerve; also lingual paresis; probably also a slight want of control over the right orbicularis palpebrarum. The movements, whose partial loss could clearly be determined, were those of the following muscles or muscular groups: Zygomatics, levators and depressors of the angle of the mouth and lips, platysma, orbicularis oris and certain lingual muscles. He had some power over the nasal dilator, and good control of masseter, pterygoid, and temporal movements. The muscles of articulation were therefore distinctly involved, giving an oro-lingual mono-paresis. He could talk, but pronounced certain words indistinctly, *e. g.*, "Columbia"—"Columna;" "Philadelphia"—"Pil-a-del-pha;" "truly rural"—"too-yooal;" "thievish"—"sibish." He could not pronounce the letters "a" "j" or "w" (he called the latter "double"). He pronounced all the other letters but had difficulty with "m" and "s." He comprehended objects and words by hearing and sight, and could read understandingly, but could not pronounce well owing to the above described articulatory defect. He had no difficulty whatever in propositionizing.

Recovery of the arm and leg seemed to be complete, but probably a little general weakness of these limbs remained.

The patient said in reference to sensation that when first paralyzed the arm and leg felt as if they were "asleep"—the arm more than the leg; they both then felt cold, but this feeling had disappeared with the recovery of power. He still, however, had a feeling of numbness or of being asleep in a part of the right half of the face—most marked on the cheek below the eye. He had had pain in the foot and leg for several days after the attack, and for more than a week in his arm.

He was examined for the sensations of pain, touch, and temperature. He felt the slightest touch of the finger, or of a blunt or sharp metallic point, and could discriminate points. The tests were made most carefully both on the limbs and face. He could tell the difference between hot and cold water. He was tested on various parts of the face and forearms by Oppenheim's method of simultaneously touching symmetrical points on both sides of the body. When symmetrical points were thus touched he felt both equally, discriminating for the paretic as well as the unaffected side. Having him indicate which finger on the right hand was touched, he sometimes was correct and sometimes mentioned the finger next it towards the radial side of the hand. He seemed to make this mistake more for the ring and little finger. He made the same mistake, but not so often, on the other side. He indicated the proper finger touched, but sometimes referred the touch to a phalanx or segment of the finger nearer the body. Grasping the fingers at the side of the phalanx he could distinguish the motion made. (Horsley's method.)

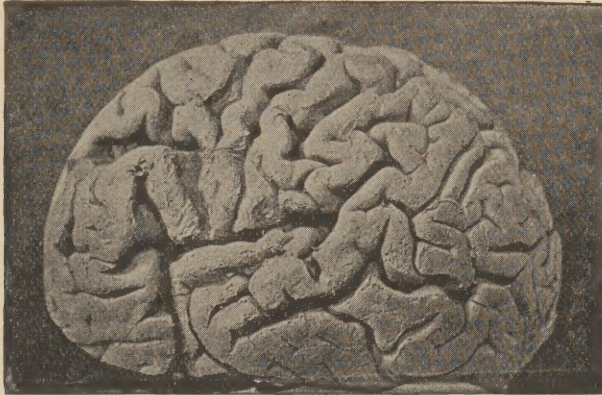


Ophthalmoscopic examination gave negative results. The veins were a little fuller than normal, the arteries natural. The disc edges were clear, and the color healthy.

He had four distinct cardiac murmurs, and all the evidences of ulcerative endocarditis, and lately of pneumonia, of which affection he died January 1st, 1889, about six weeks after he was first stricken with paralysis.

*Autopsy—Brain.*—A focus of strictly cortical, yellowish softening was found involving the lower extremities of the central convolutions, both on their external and Sylvian surfaces, and a spot one-half inch in diameter about the middle of the internal portion of the Island of Reil. The softening reached into the fissure of Rolando, and also into the pre-central fissure, thus taking in a posterior, inferior strip of the second frontal convolution. Its greatest height was  $1\frac{1}{2}$  inches, upward from the Sylvian fissure, its width along this fissure  $1\frac{1}{4}$  inches. The lesion did not reach to the anterior branch of the Sylvian fissure; its anterior limit was one-fourth of an inch from this fissure. The softening was also present, as stated, on the Sylvian surface of the ascending convolutions involving all the ascending frontal at this point and about one-half of the ascending parietal. An embolus was felt at the bifurcation of two branches of one of the larger branches of the middle central. All parts of the brain were examined and no other lesions were found. The focus of softening is indicated in Fig. 1.

FIG. 1.



Softening of the Face Area.

Highly interesting lesions of the heart, lungs, and other organs were found, but these will not be detailed here.

*Remarks.*—This case presents two points of especial interest, namely, (1) The absence of propositionizing aphasia, with the presence of oro-lingual and facial paresis; (2) The presence of subjective and the absence of objective sensory phenomena.

The case bears a strong resemblance to one reported by Bernheim<sup>1</sup> as "A case of Lingual Mono-Hemiplegia with Cortical Localization."

The patient was a girl 23 years of age, affected with multiple sarcomatous tumors, the first of which was observed in 1886. Suddenly (January 8th, 1887), a decided deviation of the tongue supervened, the tip pointing to the right. She swallowed easily, articulated fairly well, but could not whistle. No other paralysis was present, but the pressure shown by a dynamometer was four degrees less with the right hand than with the left; three weeks later, three less. The patient died on the 2d of February, lingual paralysis persisting. In addition to the generalized sarcomata, there was a cortical lesion consisting of an excava-

<sup>1</sup> Bernheim (Nancy). French Association for the Advancement of Science, 16th session, 1887. *Gazette des Hôpitaux*, p. 1016, 1887.



tion of five to six mm. in depth and in diameter, and caused by a sarcomatous hemorrhagic clot. This lesion was situated at the lower border of the post- and precentral convolution.

II. INTRACEREBRAL HEMORRHAGE INTO AN OLD CYST.—A. S., aged 56, black, a domestic, when admitted to the Hospital was unable to speak so that it was impossible to obtain a complete history. It was learned, however, that she had an apoplectic attack, November 15th, 1888. Examination December 26th, 1888, showed the lower right face paretic, the mouth being drawn to the left. The muscles affected were the zygomatic, levators of mouth and nose, depressors of the mouth, and probably the platysma. Lingual movements were uncertain; she protruded the tongue but seemed not able to turn it upward, and moved it less freely to the right than the left. The uvula deflected a little to the right. Her mental condition was such as to make it difficult to get clear answers. She tended to repeat words spoken to her. She knew what objects were, and could hear or repeat many things correctly or nearly so, but her speech was usually much jumbled in attempting to answer questions, the difficulty seeming partly due to her impaired utterance, partly to inability to propositionize. It was not possible to test her as to reading. In the right arm palsy was absolute. In the right leg paralysis was nearly complete, as she could only extend and flex the leg slightly at the knee, and could not make any foot movement. Sensation repeatedly tested was normal. After taking these notes she was able to sit up until January 12th. She could not walk nor use her arm, but her speech improved a little.

January 13th, 1889, she had difficulty in swallowing, and became stuporous. The next day Cheyne-Stokes breathing was noticed; and January 15th she lay motionless, and had involuntary evacuations. The left cheek and nostril puffed during respiration, but the right did not. Slight conjunctival reflex could be elicited and was more marked during the period of ascent in the Cheyne-Stokes breathing. Her eyes were sometimes open, sometimes half shut, usually the latter during the periods of apnoea. On calling her by name she looked as if she understood, and glanced around at times as if conscious of her surroundings, but was found not to be on close testing. She could now be stuck by a needle in either arm without response. She sank gradually.

*Autopsy.*—On opening the left lateral ventricle, a dark-red, almost black spot, about one-quarter inch in diameter, marked the position of a hemorrhage ready to break into the ventricle. It was  $1\frac{1}{2}$  inches backward from the head of the caudate body, and  $1\frac{1}{2}$  inches anterior to the posterior limit of the thalamus, being situated just where the tapering extremity of the caudate nucleus begins to curve around the thalamus. Transverse sections revealed a recent hemorrhage into an older hemorrhagic cyst. The anterior limit of the lesion was revealed by a section three-fourths of an inch from the head of the caudate nucleus; its posterior limit at one inch from the posterior extremity of the thalamus. The greatest antero-posterior extent of the lesion was therefore  $1\frac{1}{4}$  inch, thinning out towards each end. The chief destruction of the ganglia and tracts was in the middle of the area thus defined. The parts destroyed in the anterior half or third of the lesion were only portions of the lenticular body and external capsule; but a section made just behind the head of the thalamus showed almost complete destruction of the lenticular nucleus, a portion of the internal capsule and a small segment of the thalamus. A section still further back showed involvement of the lenticular nucleus and external capsule. The cerebral vessels were highly atheromatous. The entire convexity of the brain was cedematous.

III. EXTENSIVE INTRACEREBRAL SOFTENING. HEMIPLEGIA AND CONTRACTURE ON THE SAME SIDE AS THE LESION.—E. N., 44 years old, was a well-known veteran at the Philadelphia Hospital, of which she had been an inmate, on and off for twenty-five years. Nine years before her death she became a left hemiplegic, and never regained the use of the left arm or leg although she had some little power in both. These limbs were somewhat atrophied, particularly the arm. Her mind was enfeebled. She had a mitral systolic murmur. No records of past examinations could be found, although they had been made. For several days she had been complaining of not feeling well, and October 25th, 1888, while on the commode, she suddenly fell over insensible.

An examination of the patient was made a few hours later. She had evidences of an



old left hemiplegia. The left upper extremity was drawn to the side, the forearm flexed at a right angle with the arm, and the hand at a right angle with the forearm, the thumb carried entirely across the palm of the hand, the fingers usually turned inward. The contractures could be easily overcome, but on releasing them the parts returned to their contracted positions. The fingers were loose, flaccid, and easily movable to any position. They only seemed to assume a slightly flexed position from gravity or mechanical causes. They could be bent far back at the metatarso-phalangeal joints. The left leg was slightly contracted in flexion at the knee, the foot turned inward and drawn upward. The great toe was extended pointing upwards and backwards, and thrown across the second toe. The other toes were bent backward at the metatarso-phalangeal articulation. The mouth was drawn to the right.

The patient lay on her back. When placed straight her head tended to the right; but her eyes at the same time had a tendency to look to the left. The pupils were nearly the same, the left a little smaller than the right. The eyes oscillated horizontally. The conjunctivæ were insensitive. The breathing was Cheyne-Stokes. When the respiration was most active it was of the puffy, tobacco-smoker's type, in part. She used the right side of her mouth in the movements of respiration more than the left. Many mucous rales could be heard. The left arm and leg were helpless as above described; but she occasionally moved both arm and leg, especially the leg. There were slight spontaneous as well as reflex movements, usually of flexion. Handling the left arm or leg sometimes set up a clonus or trembling of the limb. Her general condition was such that it was difficult to decide as to the paralysis of the right side of the body. The right limbs certainly did not present any contractures. It was also difficult to make any certain tests for sensation, but the limbs responded by movements to prickings on the right side better than the left. Knee-jerk was present on both sides, perhaps increased on the left. Every few minutes she had what appeared to be a left unilateral spasmodic seizure, in which the left leg was drawn up and moved at the thigh and knee, the left upper extremity had a lifting upward and outward movement from the shoulder, and the face was distinctly drawn up to the left. Sometimes the arm alone moved. While studying her it was noticed that she very seldom moved her right arm or leg. Such movements as were seen, whether volitional or not, were usually on the left side.

The heart sounds were irregular, tumultuous; no differentiation between the first and second could be heard; a mitral murmur could be made out, but its character could not be determined. Her urine, drawn by catheter, was cloudy, pale; specific gravity, 1026; reaction acid; sediment white and large; pus in considerable quantity; a small amount of albumin.

*Autopsy.*—No lesions were found in the brain cortex with the exception of an ecchymosis of the pia-arachnoid over the upper third of the fissure of Rolando of the right hemisphere. Nothing was found in the ventricles. Softening was present of the middle portion of the lenticular nucleus and internal capsule, and of the Island of Reil of the left hemisphere; the white matter of the occipital lobe, and of the posterior half of the temporal lobe of the left hemisphere were also softened and broken down. The softening appeared to be due to blocking of the cortical, temporal, and some ganglionic branches of the middle cerebral, and also of some branches of the posterior cerebral arteries. Old mitral and aortic disease and pathological conditions in various organs were present.

IV. OLD HEMORRHAGIC CYST WITH APHASIA AND HEMIPLEGIA.—W.M., aged 65, white, was admitted to the Hospital in February, 1887. It was impossible to obtain any information from the patient on account of his aphasia and mental condition. It was noted on admission that he was a right hemiplegic with contractures and aphasia, almost complete, the only word he was able to say, being "yes" or "no," usually accompanied by gestures. He had an ulcer on the right leg and one on the knee. His urine dribbled continually. His heart was hypertrophied; the vessels were atheromatous. His urine contained bile and coloring matter, but no albumin or sugar. Finger clonus of the left hand and ankle clonus were present.

Notes of an examination were made January 19th, 1889. Inspection showed some



drooping of the right face. He was apparently unable to thrust out his tongue, and said, "Oh my," when asked to do it. He was not only unable to put out his tongue, but had little use of it in his mouth. The uvula was straight and the palate not very responsive. His tongue had a tendency to bunch at the back of his mouth. As nearly as could be determined, therefore, he had facial paresis in the lower distribution of the nerve, and lingual palsy.

The right arm was completely palsied; he could not move the fingers, nor any part of the arm. The arm was carried to the side, and the forearm usually at right angles across the trunk; the hand was contracted, the middle, ring, and little fingers being bent inward at the metacarpo-phalangeal articulation; the thumb flexed, adducted, and thrust between the index and the middle fingers, and the index finger flexed over the thumb. The upper extremity was not permanently rigid at the shoulder, elbow, wrist, metacarpal and phalangeal articulations, *i. e.*, it could be straightened by force, again assuming the old position. It measured an inch less than the left around the biceps. He was apparently unable to move the right leg, and kept it in one position. The thigh was strongly flexed on the pelvis, and the leg on the thigh at more than a right angle. The leg could not be straightened as could the contracted arm. The four outer toes were very slightly turned downwards. The ankle joint was free. The foot was carried in a normal position except the toes. The left leg apparently was not used and had a tendency to contracture like the right.

A marked condition of dark bronzing was present from the knees down both legs, except the soles of the feet. The arms, particularly their outer aspects, showed the same tendency in spots, but not so extreme. Below the knees it was uniform, as if the limbs were those of another man of a different race. He evidently had sensation to slight touches of sharp points, his face and manner indicating pain.

The brain lesion can be best described by the simple statement that an old cyst of immense size was present, involving and destroying the Island of Reil and the anterior two-thirds or more of the capsules and the two striate bodies.

V. TUMOR OF THE DURA MATER.—J. J., aged 32, white, born in Scotland, laborer, was admitted to the Hospital August 9th, 1888, complaining of severe headache and sleeplessness which had existed for three months. He was obstinately constipated and had lost appetite and flesh, although he was still a large muscular man. His breath was offensive; his urine was normal. Knee-jerk was normal. No paralytic symptoms were present. The right pupil was rather larger and responded to light more slowly than the left. Eight years before, while serving as a policeman in Scotland, he had been struck on the back of the head with a black-jack, was rendered unconscious, and remained so for a considerable time, and after this he suffered considerably with headache, but finally recovered. He attributed his attack to this accident and the abuse of alcohol. He denied syphilis but admitted having gonorrhoea fourteen years before admission. At the time of his last attack he was working for a plumber in different parts of the city, until his headache became so severe he had to quit. He located the pain over the right eye. It varied in intensity, always being worse at night.

On admission his temperature was 100°; pulse 50, and respiration 18. The next morning his temperature was 97°; pulse 48; respiration 18. He was extremely restless, tossing about, but perfectly conscious. His urine was scanty and high-colored, and passed only at long intervals. He was quieter and somewhat dull the third morning, and the dullness increased, so that by 10 A.M. he had to be aroused to answer questions, and then answered slowly but intelligently. Two hours later he was completely comatose with labored respiration. At 1.30 P. M. a decided change was noticed; his breathing became stertorous and slow; his pulse, which had been above 48, increased to 130; respirations dropped to 10, then 6, and after two or three ineffectual efforts at inspiration, breathing stopped. The pulse continued to beat for fully five minutes after the cessation of the respiration. Artificial respiration was tried with no effect.

The *autopsy* showed thickening of the skull about the size of a silver dollar, beginning one inch above the line of the external meatus; the skull at this point was strongly



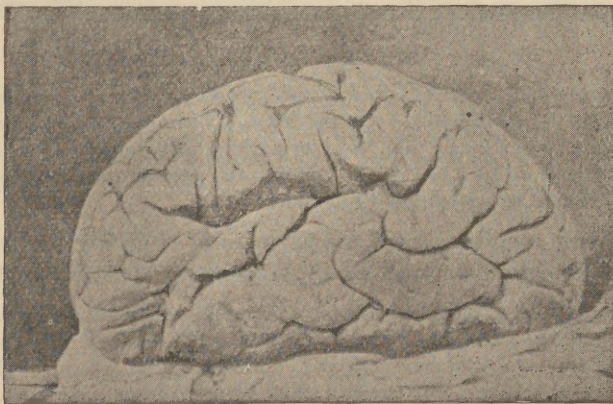
adherent to a tumor or thickening of the dura mater. The mass was flat, almost circular, one-eighth of an inch in thickness, tough and whitish-yellow in appearance. The dura and pia mater were agglutinated and adherent to the brain beneath the growth, and both skull and brain were bruised and eroded. The growth was so situated as to cross the fissure of Sylvius over portions of the posterior central, inferior parietal, and first temporal convolutions, its anterior limit being the middle of the latter. The lesion was strictly meningeal, but in enlarging had slightly invaded both the skull and brain substance. Subsequent examination showed the growth to be syphilitic.

VI. TUMOR OF THE ANTERIOR FOSSÆ AND ORBITAL LOBES.—M. K., 72 years old, was admitted to the Hospital unconscious with a history of epilepsy, or, at least, of convulsions. When admitted her breathing was puffing and she was in a stupor. Albumin was found in her urine, and she came out of the stupor after a hot-air bath, and improved under digitalis and ammonia, but she remained very dull, and her answers to questions were usually neither relative nor coherent. Her mouth was drawn a little to the left, and the right arm was paretic. Sensation was preserved. The skin reflexes were marked. She again sank into a stupor and died.

At the *autopsy* the dura mater was found to be strongly attached to the skull, and to the pia mater over the postero-parietal region. Scattered ecchymotic areas were found, particularly over the left hemisphere. The pia stripped readily from the brain. Some of the convolutions were somewhat atrophied. Superficial softening of each caudate nucleus was found—an irregular patch about the size of a dime, extending only a few mm. into the brain substance. A large, soft, purplish tumor filled up the floor of the skull and the longitudinal fissure between the anterior extremities of each hemisphere; the growth reached from the optic chiasm to the tips of the hemisphere invading the orbital lobes and involving the olfactory bulbs. Close examination showed that it chiefly encroached upon the left hemisphere, the convolutions invaded being the mesial and orbital surfaces of the left hemisphere, the convolutions invaded being the mesial and orbital surfaces of the left frontal, and the extreme anterior portion of the gyrus fornicatus.

VII. SPECIMEN SHOWING THE RELATION BETWEEN THE RETRO-INSULAR AND SUPERIOR TEMPORAL CONVOLUTIONS.—Within the Sylvian fossa behind the Island of Reil, two or three convolutions usually present have received but little attention from students of the brain. These are known as the retro-insu-

FIG. 2.



Relation of the First Temporal to the Retro-Insular Convolutions.

lar or temporo-parietal convolutions. A glance at them, particularly as seen in brains in which the operculum is imperfectly developed, shows that they are connecting gyres between portions of the temporal and parietal lobes, as the



convolutions of the insula are apparently between more anterior parts of the temporal and both the parietal and frontal lobes. In a number of human brains I have observed indentation or cross-fissuration of the first temporal convolution, indicating a tendency to confluence between the anterior portion of the first temporal fissure, and the fissure which separates the two most anterior retro-insular convolutions.

The specimen showed almost complete confluence between these fissures, making the anterior half of the first temporal continuous with the first retro-insular convolution, the other retro-insular gyres blending with the posterior portion of the first temporal.

This specimen and the others referred to make it probable that the first temporal and retro-insular convolutions hold morphologically and functionally some close and peculiar relation.

VIII. THE BRAIN OF AN IDIOT.—The patient was a boy 10 years of age who had been idiotic from birth. He was completely aphasic, and was paralyzed with contractures on both sides of the body, but much more markedly on the right.

FIG. 3.



Left Hemisphere of the Brain of an Idiot.

A small portion of the cerebellum was uncovered by the cerebrum. The Island of Reil was uncovered in both hemispheres. On the left side owing to the great arrest of development of the third frontal, central, and inferior parietal convolutions, the insula, and retro-insular convolutions were seen in their full extent, the gap between the fronto-parietal and temporal lobes being at its widest point  $1\frac{1}{2}$  inches.

The specimen affords a good opportunity of studying the relations of the insula and retro-insular convolutions to the temporal, parietal, and frontal lobes.

The insula and the retro-insular convolutions were clearly distinct from each other, the latter, three in number, connecting the posterior half of the first temporal with the inferior parietal convolution. The anterior half of the first temporal was more closely related to the convolutions of the Island, and these in their turn with the central and frontal convolutions, particularly the third frontal.

The Island of Reil and retro-insular convolutions of the right side were also clearly exposed, the gap, however, at its greatest width measuring only one-half an inch. In both hemispheres the fissures and convolutions were generally simple and low in type and arrangement. On both sides, for example, the first and second frontal, the precentral, cen-



tral, retro-central, and interparietal fissures were well-defined and easily determined, and the fourth and fifth temporal fissures demarcated typical lower temporal convolutions. In the parieto-occipital region the gyral and fissural arrangements were ape-like, showing peculiarities of development in the transition gyres. The left first temporal fissure almost communicated with the parieto-occipital, and the posterior arm of the interparietal fissures. The left first occipital or superior parieto-occipital annectant convolution was ill-developed, and just below the surface. On the right, the anterior arm of this transition convolution of Gratiolet was depressed, but the posterior was well to the surface. On both sides the parieto-occipital and calcarine fissures were separated by an inferior internal connecting convolution, larger on the left. The cuneus on each side was fairly well-developed, and of good size for the size of the brain, the only apparent arrest being of the portion formed by the posterior arm of the first occipital convolution. On both sides the callosomarginal fissures were badly defined, on the left separated into two parts by a large convolution, on the right separated into three parts by interposed convolutions.

IX. OCCIPITAL LOBES OF A MAN BLIND MORE THAN TWENTY-FIVE YEARS.—The patient from whom these specimens were obtained died at the Philadelphia Hospital, alleged to be between 70 and 80 years old. He was a harmless dement, positively known to have been blind for more than twenty-five years.

The notes will be confined to a brief description of the occipital lobes and adjacent parieto-temporal region (the portions of the brain included by different observers in the visual area).

*Left Hemisphere.*—The cuneus was small. The arrest of development was apparently more on the side of the calcarine fissure. This fissure was crossed by a convolution in its posterior third. The parieto-occipital, calcarine, and hippocampal fissures showed a decided tendency to confluence. The first occipital convolution of Ecker (superior external *pli de passage* of Gratiolet, and par-occipital of Wilder) showed decided atrophy or lack of development; its posterior arm was a much narrowed convolution, so depressed below the surface as to allow partial confluence between the parieto-occipital fissure and the interparietal. The entire occipital lobe was unquestionably small; the second and third occipital convolutions of Ecker were readily made out, but presented a narrow, dwindled appearance. The parallel fissure was imperfectly developed, bridged in its posterior third, and turned upwards just back of the Sylvian fissure. The angular gyre was fairly well developed, occupying a position just in front of the line of the parieto-occipital fissure which was apparently thrust back. *Right Hemisphere.*—The cuneus was small. The calcarine fissure was imperfectly bridged near its posterior extremity. The same tendency to confluence of the parieto-occipital, calcarine, and hippocampal fissures, and the absence of internal annectant gyres were noticeable here as in the other hemisphere. Here also as upon the other side, the first occipital fissure of Ecker was small and depressed below the surface. The entire occipital lobe, posterior to the parieto-occipital fissure, was again unquestionably small. The conditions about the parieto-occipital fissure in both hemispheres were somewhat ape-like, and like those which have been found in the brains of paranoiacs, criminals, negroes, and idiots. The first temporal or parallel fissure was well marked in this hemisphere, the angular gyre being entirely in the parietal lobe and of fair development.

X. BRAIN OF A MAN, DEAF-MUTE MORE THAN THIRTY YEARS.<sup>1</sup>—It is only necessary for the purposes of this report to state that the patient from whom this brain was removed was an old man who had been deaf for more than thirty years, and had no disease of the brain. A photographic view of the left hemisphere is given in Fig. 4.

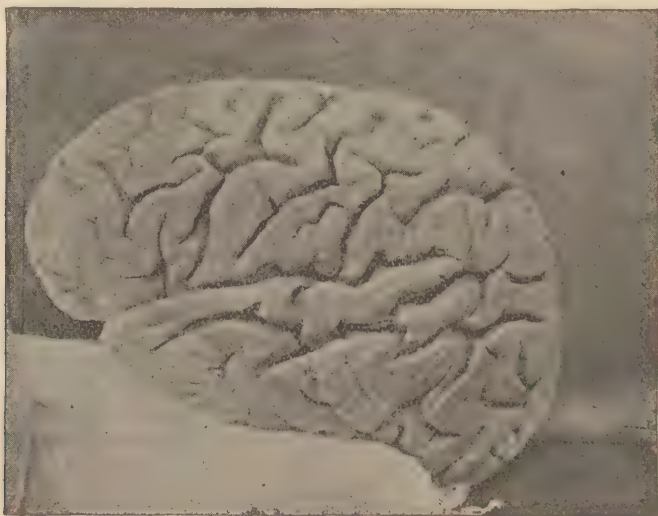
The first temporal convolution of the left hemisphere was *narrow and very smooth*, particularly in its anterior half and posterior fourth, while about the centre of the convo-

<sup>1</sup> Presented by Drs. Charles K. Mills and Roland G. Curtin.



lution was a secondary cross fissure which nearly divided it into two parts, this fissure being continuous with that separating the two retro-insular convolutions. At its posterior extremity the first temporal convolution was either split longitudinally into two parts, or else the lower of these might be regarded as the posterior extremity of the second temporal. As a whole the first temporal convolution appeared less in bulk than usual. The parallel fissure was not quite continuous. At about the junction of its fifth with its last sixth, it was bridged below its surface by a small connecting convolution. This fissure turned up close behind the horizontal Sylvian. The second temporal convolution showed no very distinct antero-posterior fissuration separating it from the third convolution. Posteriorly a fissure ran antero-posteriorly for a distance of two inches, and if this was regarded as the inferior boundary of the second temporal convolution, the latter was very small. The middle third of the second and third convolutions were fused, either together or the middle portion of the second was lacking. The fourth temporal or fusiform, the lingual, hippocampal, and uncinate gyres were well defined. The left third frontal gyre was small, particularly in its hinder part, the posterior portion of the arch around the ascending Sylvian be-

FIG. 4.



Left Hemisphere of the Brain of a Man, Deaf-Mute more than thirty years.

ing very narrow. The lower extremities of the central convolution were narrow and pointed; the band of convolution between the Rolandic and Sylvian fissures very thin. A small segment of the Island of Reil could be seen when the lobes bordering the fissure of Sylvius were drawn close together. The Island appeared to be diminished in size.

On the right side the first temporal convolution was rather smaller than usual, but did not present marked diminution shown by the first temporal on the other side; it was smaller in its anterior half. The parallel fissure turned upwards further back than on the left side. The antero-posterior separation between the second and third temporal convolutions was better, so that the two convolutions could be defined. The other temporal convolutions were of fair size and definition. The right posterior portion of the third frontal was atrophied. Comparing the right with the left, the lower extremities of the two central convolutions on the right were not so pointed or dwindled as on the left. The loss of bulk on the right seemed to be more confined to the posterior portion of the third frontal. Both occipital lobes were well developed, a marked difference in this respect being shown between this brain and that of the blind person.<sup>1</sup>

<sup>1</sup> I am indebted for the photographs with which these reports are illustrated to the courtesy of Dr. B. Alexander Randall, of Philadelphia.

Making a comparative general statement, it may be said that the occipital lobes of this deaf-mute brain were distinctly larger, and the upper temporal convolutions distinctly smaller than in the brain of the blind man. Both hemispheres of this brain showed the close connection between the retro-insular and the anterior portion of the first temporal, and the posterior retro-insular with the posterior part of the first temporal convolution. The motor and pre-frontal lobes, with the exception of the third frontal as detailed, were well developed. The acoustic striæ were evidently atrophied. They were compared with two other specimens and were found to be greatly attenuated.

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